

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2G4: Industrial Communication	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Prerequisites: Programming ability and an understanding of basic networking, OS, and architecture issues.

Objective: The focus of the course is on the protocols, algorithms and tools needed to support the development and delivery of advanced Industrial network for Control and communication

COURSE CONTENTS

Unit I

Historical Overview of Industrial Automation and Communication Networks, Hierarchical Levels in Industrial, Communication Networks, Transmission Methods, Industrial Network Components, Network Topology.

Serial Communication Standards: Standards organizations, Serial data communication interface standards, Balanced and unbalanced transmission lines, Synchronous & asynchronous communication, RS 232,422,485 interface standards and Troubleshooting.

Parallel Communication Standards : Parallel data communications interface standards - General purpose interface bus (GPIB) or IEEE - 488, The Centronics interface standard, The universal serial bus (USB), Different configuration modes - two wire & four wire point - to -point & multidrop connections.

Unit II

HART Communication protocol - Evolution of signal standards, features of HART protocol, Communication modes, HART networks, HART Data format or telegram structure, field device & Control system interface to HART bus, HART cabling considerations, HART commands and types, HART field controller implementation, 3 layers of HART-OSI model, DDL and compatibility, Advantages and applications of HART protocol.

Unit III

Field Bus: Basics, Architecture, OSI -model, FF/Foundation FB segments, interconnection type -distributed and Chicken foot, FFB types -H1 & HSE, Network design and system configuration, General considerations, advantages of FB & Foundation FB and their comparison.

Unit-IV

Controller Area Network DeviceNet, CANopen, Interbus, Actuator Sensor Interface (AS-I), ControlNet.

Unit-V

An Introduction to Industrial Ethernet Ethernet's Roots', Ethernet Physical Layer, Data Link Layer, The Ethernet Frame, Hubs and Switches, Higher Level Network Functions, Ethernet and Industrial Systems, Industrial Ethernet communication protocols

Text Books and References:

- [1] Steve Mackay, John Park and Edwin Wright, "Practical Data Communication for Instrumentation and Control", Newnes Elsevier, 2002.
- [2] David Bailey and Edwin wright , "Practical SCADA for industry", Newnes Elsevier.
- [3] Romilly Bowden, 'HART application Guide', HART Communication Foundation, 1999.